WEEDS and TURF
PEST CONTROL
A SECTION OF PEST CONTROL MAGAZINE
AUGUST 1962

Home Lawns in Florida need year round care, and contract applicators are cashing in with improved methods and chemicals, author Tomasello says.

913 Florida Spraymen Gross $25 Million Yearly

By **RUDOLPH TOMASELLO**
Tomasello Spray Company
West Palm Beach, Florida

SOUTH Florida is unique in its mild, subtropical climate, and lawn insects and diseases flourish the year round. The cooler winter months find insects less active and less abundant but never completely dormant. However, such turf diseases as Brown Patch and Dollar Spot are most active during the winter. These and other factors make lawn and ornamental spraying not a seasonal, but a year round business.

A number of significant changes have taken place in the lawn and ornamental spraying business since 1928. During this early period, there was only one established spray company in Palm Beach County. Not until after World War II did the picture begin to change. Today this is a large and fast-growing industry. According to Frank L. Wilson, entomologist for the Florida State Board of Health, there are 913 certified lawn and ornamental spray companies in the state. The largest number of these companies are located in South Florida. Dade County has 248, Broward County has 200, and Palm Beach County has 74. Wilson estimates that the gross income from lawn and ornamental spraying in Florida is between 20 and 25 million dollars a year.

Chinch Bug Spurs Industry Growth

The chinch bug, which is seriously damaging to St. Augustine grass, has been primarily responsible for the growth of the industry. Florida has grown rapidly in recent years. It is estimated that 5000 people are coming every week to make the state their home. Thousands of new houses are being built every year and most of

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Tree spraying contracts are lucrative too, Florida sprayman Tomasello says. Once operators have the equipment and know-how, these big jobs can increase billings. Most major equipment manufacturers offer versatile high-power sprayers to enable contract applicators to diversify.

the lawns are planted to St. Augustine grass.

Chinch bugs have always been very difficult to control and the first effective insecticides were DDT, chlordane, and toxaphene, all of which became available at about the same time. Chinch bugs reproduce continuously in South Florida and homeowners soon learned that it was much more satisfactory, and in some cases cheaper, to have a commercial company spray their lawns than to try to control chinch bugs and other insects themselves.

Spraying for chinch bugs is by no means the only source of revenue for the industry. Such lawn pests as sodworms, armyworms, mole crickets, the hunting bill bug, Rhodes grass scale, and nematodes attack not only St. Augustine grass, but all of the other turf grasses planted in the state. Not only are insect pests damaging to turf grasses, but fungus diseases are widespread and destructive. Liquid fertilizing of lawns and correction of nutritional deficiencies are other important services offered to the homeowner. These services find widespread acceptance.

Long before effective insecticides were available to control chinch bugs, the spraying of ornamentals and fruit trees was a profitable business. The desire of homeowners for more beautifully landscaped and maintained properties is creating an even greater demand for insect control on all landscaped materials. Fruit trees are widely planted and used in landscaping in South Florida and such trees as citrus, mangoes, and avocados must be properly sprayed and fertilized if they are to produce good crops and to be of ornamental value.

After several years of successful use, DDT began to lose its effectiveness against chinch bugs. Parathion was then discovered to be the most economical and best insecticide for killing chinch bugs and came into wide use by commercial spray operators over the entire state. Parathion is a highly poisonous material to man and warm-blooded animals. It had been reported to have caused the death of several people. When birds died, several dogs were lost, and there were cases of children having been made very sick following the spraying of lawns, a great deal of pressure was brought to bear on public health officials. In 1960 the Florida State Board of Health passed regulations governing commercial spraying of lawns and ornamentals in residential areas with highly toxic pesticides. Twelve insecticides were placed on this restricted list but only parathion was in wide use.

At the present time, less parathion is being used, not only because it is a restricted material, but because chinch bugs have become, in many lawns, highly resistant to it. Trithion has proven to be effective in most all cases of these resistant chinch bugs.

Spray Firms Offer Lawn Contracts

Most all spray companies offer contracts for the spraying of lawns and ornamentals. These contracts vary widely from company to company. Some companies have lawn spraying contracts that include the control of chinch bugs only. Additional charges are made when spraying for all other lawn pests. Some companies offer a contract for three sprayings a year, while others offer nine. Then there are those that offer once-a-month service. Many companies give a contract to include the spraying of the lawn, vines, shrubs, and trees on a monthly basis to cover the control of insects and diseases, but not the control of nematodes. This is becoming the most popular contract and one that fills homeowner's needs.

Recently landscape and estate maintenance companies and nurseries have purchased power sprayers and have included the spraying of lawns and ornamentals as part of their service, while a smaller percentage of companies, starting out strictly as custom sprayers, have turned to selling nursery stock, sod grasses, garden supplies, and equipment. It appears that operators who restrict themselves to lawn spraying will be placed in an unfavorable position as new grasses, resistant to chinch bugs, become more widely planted and the complete estate maintenance service makes inroads in the custom spray business.

Slowly but surely the unethical operator, the poor business manager, the uninformed and the untrained custom spray operator will be weeded out by this competition. He will be replaced by more able and better qualified men. These men will know grasses; they will be horticulturist, botanist, entomologist, pathologist, nematologist, and merchandiser, and will reap the bounty of this rapidly growing market.

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Published Monthly by
TRADE MAGAZINES, INC.
1900 Euclid Avenue
Cleveland 15, Ohio

JAMES A. NELSON
Publisher

CHARLES D. WEBB
Section Editor

R. J. HOFFER
Circulation Manager

Advertising Representatives
National Headquarters
1900 Euclid Avenue
Cleveland 15, Ohio
Phone: Area Code: 216 + 771-4169

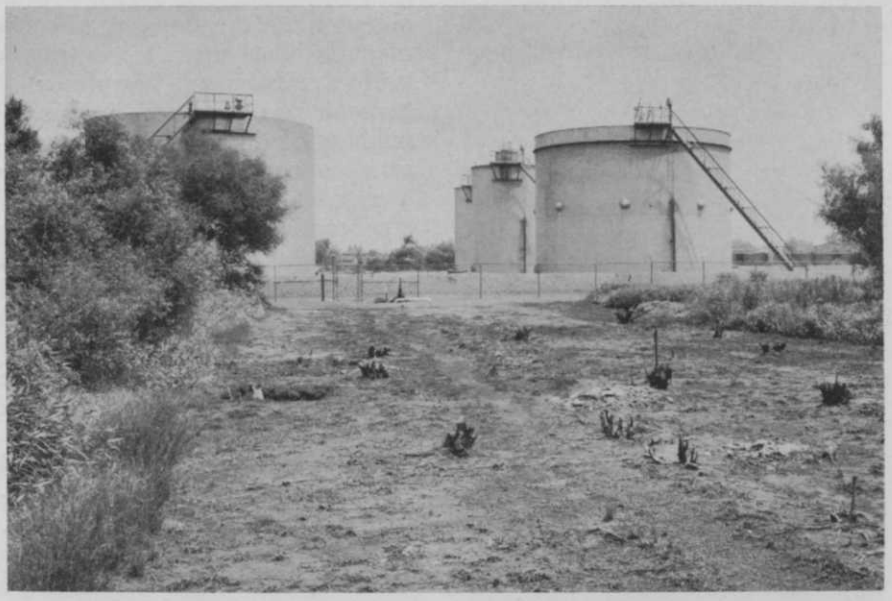
New York City
Billingslea & Ficke
420 Lexington Avenue
Phone: Area Code: 212+LExington 2-3667

Contents © Trade Magazines, Inc., 1962

How Chlorea Herbicides Work

By LESLIE R. REED

Technical Service Department
Chipman Chemical Company
Bound Brook, N. J.



One suggested application for Chlorea herbicides is for control of weeds around tank farms and pipe lines. This installation, including the pipeline path in the foreground, was successfully treated with Chlorea, with less fire hazard and easier accessibility as direct results.

CONTRACT applicators are in a "front line" position to handle many of the noxious weed problems which are encountered in industry today. Many companies have available a broad line of weed killers for practically every type of weed problem and CAs must choose the product most suited to the particular application.

Broadly speaking, chemical weed control can be divided into five distinct types:

1. *Soil sterilization* — elimination of all vegetation, or total weed control.
2. *Weed and brush control* — where there is no need to worry about damage to nearby desirable plants.
3. *Weed and brush control* — where *special care* has to be exercised so that desirable plants are not injured.
4. *Turf and lawn weed control.*
5. *Weed and algae control in lakes and ponds.*

Each of these areas requires its own specific type of weed control chemical and its own special method of use. The following information deals with soil sterilization, or elimination of all vegetation.

Chlorea herbicides fall within the class of chemical weed killers known variously as soil sterilants, nonselective herbicides, or total weed killers. Where applied to the soil, these total weed killers generally render it unfit for plant growth for varying lengths of time. The length of time they persist in the soil and prevent regrowth depends on the particular chemicals used and the amount lost through oxidation, leaching, and microbial breakdown. These losses are largely dependent on the amount of chemical applied, soil type, rainfall, and to some extent, temperature. The degree of persistence has immense practical importance as we shall see later.

Common Weed Control Jobs

Before discussing these Chlorea formulations and how they fit into this picture, let us first review some of the weed situations that CAs are likely to be called on to handle. Generally speaking, whenever vegetation is unsightly, creates a nuisance or fire hazard, or harbors pests, it should be removed. Below are listed typical locations where weed problems exist:

Private homes and areas — weeds in driveways, tennis courts, courtyards, stable yards, patios; around buildings and school playgrounds; along fence lines; also around motels and camps.

Industrial areas — weeds in areas around warehouses, storage tanks, fence lines, ammunition dumps, pipelines, power lines, electrical installations, ditch banks, railroad and streetcar yards, freight yards and sidings.

Municipal and county installations — weeds in parking areas; around road signs, guard rails, lane dividers, bridge abutments, airfields, airports, airstrip lights, fences, fire breaks, tennis courts, road maintenance equipment depots, drive-in theaters, parks.

This is quite a formidable list of weed control opportunities which offers worthwhile opportunity to expand business.

To tackle any of these weed problems intelligently, some knowledge of weeds is required. Unwelcome plants can be divided into the broad categories shown in Table 1.

A further division, which includes both of the categories shown in the table, is shallow-rooted and deep-rooted growth. Obviously, deep-rooted perennials, such as dock, quack grass, thistle, or bindweed, are much harder to kill than, for example, the shallow-rooted annual crabgrass or plantain. Different chemicals are required for each type. Easiest weeds to kill are the shallow-rooted annuals, and if the right chemical is put on *before* these plants germinate in spring, complete control of such weeds for an entire season can usually be obtained.

Hardest weeds to kill are gener-

Table 1. General Classification of Weeds

Grassy Weeds:	Broadleaved Weeds:
Such as quack grass, crab grass, and orchard grass; these may be either annuals or perennials.	Like dandelions, plantains, chickweed, docks and thistles. These, too, may be annuals or perennials.

ally the deep-rooted perennials. Top kill alone will not usually destroy the rest of the plant, as it will almost always resprout. For deep-rooted weeds, a special chemical is required — one that is soluble in soil moisture and will "leach" down through the soil into the root zone, where it is absorbed by the roots. Chemicals that are absorbed by the leaves and translocated into the roots may also achieve total kill.

Complete nonselective weed control thus requires a weed killer which can handle all the different types of weeds in a particular situation. No *one* chemical can do this efficiently and economically. Some chemicals are selective for grass and will not harm broad-leaved weeds; others are active in the reverse direction; still others are too insoluble and are therefore no use for weeds with deep roots. Therefore, what is needed is a product which is a *combination* of chemicals. The Chlorea line of weed killers is among those developed to give broad spectrum weed control.

Chemical Analysis of Chlorea

Chlorea is a combination of three weed killers — sodium chlorate, sodium metaborate, and monuron. These chemicals are recognized weed killers by themselves, but in combinations thay have unique characteristics of vegetation control at different root levels in the soil.

Sodium chlorate functions variously in Chlorea. First, it is a strong oxidizing agent and kills all foliage by contact. To do this it penetrates the leaves, even within the living cells. Here it upsets the metabolic processes to such an extent that they can no longer function properly and the cells and leaves collapse and die. If the sodium chlorate does not destroy all the top growth immediately, it may also be translocated to other parts of the plant, even downward into the roots and other underground parts, where it again exerts its toxic action. Second, the sodium chlorate is very soluble in ground moisture, and consequently penetrates soil deeply, coming into contact with and killing the roots of the weeds. Third, sodium chlorate, because of its oxidizing action, helps to prevent too rapid a breakdown of the monuron by soil microorganisms, thus prolonging the latter chemical's action.

Sodium metaborate has two special functions in Chlorea. First, it acts as a very efficient damper on sodium chlorate which otherwise might increase the flammability of treated organic matter. In other words, sodium metaborate is used as fire suppressant material. Second, the sodium metaborate is itself highly toxic to plants through their roots. It leaches more slowly than sodium chlorate, acts slower, and thus helps give a more prolonged effect.

Monuron, the third chemical in Chlorea, is almost insoluble in ground moisture, so it tends to stay in the top inch or so of soil. Here it prevents weed seeds from germinating and growing into established plants, as well as exerting direct toxic action on weeds that have their roots in this top zone.

Fourfold Action of Chlorea

Thus, the actions of Chlorea are fourfold because of the three very active and very different constituents. They —

1) Kill off top growth.

2) Kill deep-rooted perennials and prevent resprouting.

3) Kill shallow-rooted plants.

4) Prevent weed seeds from establishing themselves.

What happens to weed seeds in the soil? Generally speaking, seeds are not affected directly by the chemicals in Chlorea. As soon as seeds start to germinate, however, and absorb some of the soil moisture containing the chemicals, the seeds succumb and "weedlings" seldom, if ever, see the light of day. Thus, the top layer of soil is rendered very inhospitable for a considerable time as far as most weeds and seedlings are concerned.

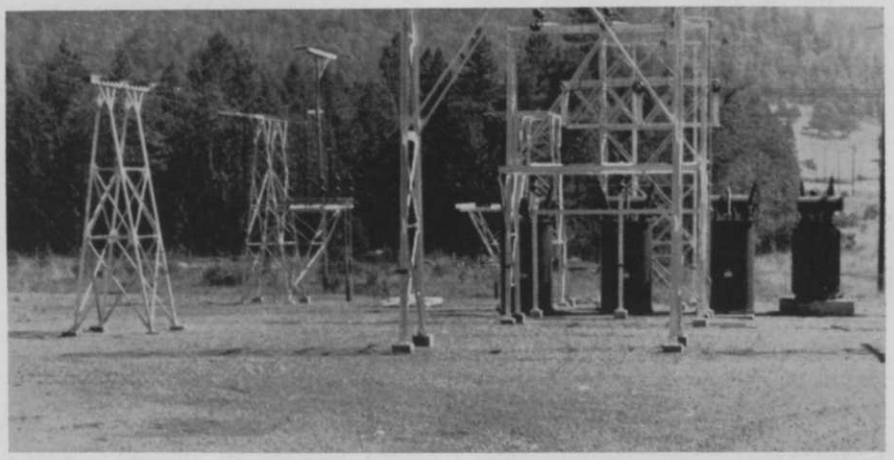
How long will the soil stay sterile? This depends on how much Chlorea is applied and amount of rainfall following application. As a rule, one application at recommended rates will prevent reinfestation for at least one full season under average rainfall conditions. Usually, reinfestation starts with a particular species, and as the chemicals leach out of the soil or are otherwise lost, more and more species begin to flourish. It may take several years or longer for reinfestation to become equal to the original state. A well-informed operator will not permit this to happen, but will re-treat at one-half rates every other year or as necessary.

Formulations Offered

There are three Chlorea formulations available: Chlorea 125; Chlorea 3; and Chlorea Granular.

Chlorea 125 and Chlorea 3 are in powder form and both may be applied dry or as a water-mixed spray. Chlorea 3 contains more than twice as much monuron as Chlorea 125, and, consequently, lasts longer in preventing reinfestation. Recommended application rates vary from 1 to 3 pounds per 100 square feet, with half rates for follow-up treatments in following years. Chlorea Granular consists of small granules or pellets which are easy to apply by hand or in mechanical spreaders de-

(*Continued on page W-11*)



Utility stations, such as this electrical complex, are good targets for weed elimination with Chlorea herbicides, this article reveals. Improved visibility, accessibility, and freedom from fire hazards are the benefits bestowed by professional weed control services.

The Coming Market for Industrial Weed Control

By G. G. FISHER

Sales Manager
Fisons (Canada) Ltd., Toronto, Ontario

WIDE acceptance of chemical weed control is associated by most people with the early post-war years, and typified by the introduction of chemicals like 2,4-D for selective control of weeds in turf and agricultural crops.

Widespread chemical control of weeds for industry was of later origin, and has increased rapidly only since the mid-nineteen fifties, when new herbicides became available. It has opened up a new field for contract applicators, which can be entered with very little change of existing personnel and equipment.

As in the USA, no precise figures on the size of the Canadian market for industrial weed control are available, but at the present time, excluding the specialized needs of the railways, industrial sites sprayed for weed control probably total 10,000 acres each year, with approximately two-thirds treated by spray and the remainder treated with chemical in dry form.

The oil and gas industry is also a well-developed section of the industrial weed control market, especially for contract application. It was recently estimated that if chemical weed control was practiced throughout, yearly cost would be $625,000 for refineries and $2 million for the entire Canadian petro process industry. This figure is doubtless much higher in the United States.

Market expert G. G. Fisher, Sales Manager for Fisons (Canada) Ltd., has rosy predictions in this analysis of industrial weed control sales in North America.

Other major users are highways, utilities, the Armed Forces, airports, municipalities and general industry.

Industry vs. Crop Use

Nonselective weed control for industry is quite different from the selective control practiced in turf or agricultural crops. On industrial sites there are no leveling influences on weed growth such as cultivation and crop or grass competition, and soil type and drainage may vary widely within short distances. Consequently, weeds on waste areas have great variety in species and vigor, and application rates of chemicals should approximate those necessary to control the most resistant perennials present.

If all weeds are not killed, those surviving will have full benefit of the light, water, and nutrients which previously supported the entire weed population, and may sometimes grow with enhanced vigor.

More general use of chemical weed control in industry stems from the introduction of new organic herbicides of the soil sterilant type. Those most often used are monuron and diuron, of the substituted urea type, and simazine and atrazine, commonly known as triazine derivatives. They are all characterized by a high rate of herbicidal activity, and in Canada and like areas are seldom used at rates higher than 40 lbs. of commercial product per acre. They are almost entirely root absorbed, requiring uniform application to the soil surface rather than to the weed foliage, and consequently are largely independent of weather conditions at the time of application. Water solubility is very low, ranging from 240 p.p.m. with monuron down to only 5 p.p.m. for simazine, and they can remain in the soil for long periods to control fresh weed growth. Finally, except for the effect on plants, these are relatively inert chemicals, low in toxicity to humans and animals, and noncorrosive and noninflammable.

Typical Control Program

A typical six year program of industrial weed control suitable for such areas as Eastern Canada, based on over-all spray treatment every other year and spot treatment with dry granules in intervening years, is shown in Table 1. Note the gradual decrease in dosage rates as weed control becomes more of a preventive operation.

Table 1: Proposed Weed Control Program Suitable for Eastern Canada and Like Regions

	Herbicide	Type of Treatment	Rate per acre	Time of application
1st year	Simazine 50W	spray over-all	40 lb.	Spring
2nd year	Atrazine 4G	spot with dry granules	50 lb.	Summer
3rd year	Simazine 50W	spray over-all	30 lb.	Spring
4th year	Atrazine 4G	spot with dry granules	50 lb.	Summer
5th year	Simazine 50W	spray over-all	20 lb.	Spring
6th year	Atrazine 4G	spot with dry granules	50 lb.	Summer

An industrial plant requiring sterilant weed control is faced with three choices. They can spray with their own equipment, spread dry granules with relatively simple equipment, or else call in the services of a contract applicator. Each method has its merits and disadvantages.

If a sprayer is owned, soil sterilant weed killers can be purchased and applied at the most suitable time of year, usually in the spring or fall, to obtain greatest efficiency and a minimum of dead weed remains. Many industrial concerns are, however, reluctant to make labor and equipment available for a maintenance practice which has little direct effect on their main production.

Weed killers in granular form can be applied dry and are more convenient than sprays on small and dispersed sites. The major disadvantage of granules is their high cost, which is often twice that of the same amount of active chemical applied as a spray.

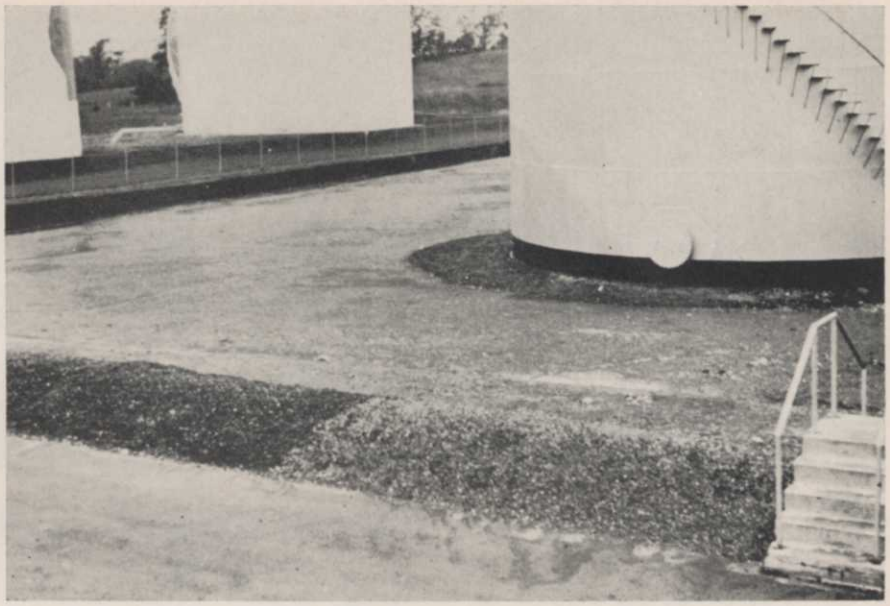
The third alternative is to have

professional treatment by a custom applicator. With his large equipment and skilled crews he can apply a range of chemicals or chemical mixtures with a minimum of interference, and by giving a guarantee can shoulder entire responsibility for results over a period of one season, two years, or even longer.

There are, to be sure, some aspects of a contract spray service for industrial weed control, apart from actual cost, that are less attractive to the customer than using his own personnel.

For example, the contract sprayer cannot always spray more than a proportion of the season's work at the optimum spring or fall periods. Neither can he always have men and equipment immediately available, sometimes to treat only small areas many miles away. These difficulties still have to be overcome by skillful use of chemicals and careful choice of equipment.

In Canada and like sections of the U.S., the rough calendar of operations which follows will enable contract sprayers to obtain most efficient results.



From Canada to Texas enterprising CAs are cashing in on such weed control prospects as oil tank compounds, where unwanted vegetation, when mechanically cared for, can gnaw into profits. Oilmen are turning to chemicals, and most of them are calling on the contract applicator for treatment.

Spring

Spraying with sterilant only can start as soon as snow has gone and the ground can take equipment. Spraying before or during weed emergence while there is still ample soil moisture gives optimum results and minimum dead weed remains — important from both appearance and fire hazard considerations.

Early Summer

On standing weeds, quicker control is desirable, and can be obtained firstly by changing to a more soluble soil sterilant, e.g. from simazine to atrazine, and secondly by use of quick-acting additives. Amitrole (4 to 6 lbs. active per acre), dalapon (10 to 20 lbs. per acre), TCA (20 to 60 lbs. per acre), and 2, 4-D (1½ to 3 lbs. per acre) are common additives. As a precaution against vapor drift, use only amine 2,4-D in most locations.

MidSummer

Dry soil conditions and mature weed growth make for slower control and less certain results from soil sterilants, and unless cutting is done before treatment there will always be unsightly dead remains after control. It is better at this period to turn to brush control, but if soil sterilization must be done a good proportion of quick-acting herbicide should be added to the sterilant. This is a useful period for touchup treatment to missed places or to control patches of regrowth in a previous year's over-all application.

Fall

From mid-September until freeze-up, the least soluble soil sterilants, such as simazine can be used. Additives are unnecessary.

CA Opportunities Abound

Custom applicators can reach some of this industrial weed control market merely by keeping their eyes open.

Many sections of industry are resigned to the nuisance which weeds cause and remain unaware of the chemicals and services that can deal effectively with the problem. Direct mail advertising from the CA may often bring a response. Chemical companies can assist by promoting their products, especially by advertising in trade journals and by provision of literature.

If a canvass of industrial prospects is undertaken, it should be related to the cycle of seasonal weed growth. No one thinks of weeds when snow covers the ground, and presence of a weed problem is often not fully realized until after the best time for treatment has passed. A site inspection in early September can emphasize to the customer the damage done by weeds and this gives accurate information to the custom applicator on which to base his spring treatment.

Note to applicators . . .

Recommendations in this article are based on formulations produced by Fisons (Canada) Limited, and are not to be used for applications in the United States.

Simazine and Atrazine are manufactured in the United States by Geigy Agricultural Chemicals, Division of Geigy Chemical Corporation, and distributed through chemical jobbers as Simazine 80W and Atrazine 80W. Both are wettable powder formulations containing 80% active ingredient. Granular formulations are available as Atrazine 8G (8% active ingredient) and Simazine 4G (4% active ingredient).

100 Delegates to 2nd Annual Hyacinth Control Society Meet Find Emphasis Shifting from Mechanical to Chemical Methods

Late in the 19th Century, the story goes, a Florida citizen attending a New Orleans Cotton Exposition was so taken with the beautiful water hyacinth on display there that he carried a specimen back to plant in a lawn fountain on his St. Johns River estate.

Today the water hyacinth is a curse to navigation in Florida and throughout the South, and accounts for millions of dollars spent to control the hardy, prolific and now rampant plant.

This hyacinth dilemma is the chief reason for forming the Hyacinth Control Society, which held its second annual meeting July 8-11 at the Governors Club Hotel in Fort Lauderdale, Fla. Nearly 100 delegates from eight states attended the comprehensive seminar, made up of scientists, manufacturers, and applicators with a common goal: the elimination or control of the water hyacinth.

Two generations of accomplished scientists found the Hyacinth Control meet a social as well as practical occasion. Distinguished USDA medical entomologist (now retired) Dr. Fred Bishopp and his wife (left) found time to chat with Dr. and Mrs. Lyle Weldon. Dr. Weldon is with USDA's aquatic weed laboratory in Ft. Lauderdale.

Other aquatic weeds were also discussed at the four-day meeting which attracted America's foremost authorities on the noxious hyacinth. Mechanical and chemical control methods were examined, new herbicides were described, and refresher information on identification and habits was offered the dedicated conclave.

One highlight of the Fort Lauderdale meeting was an address by William E. Wunderlich, Chief of the Aquatic Growth Section, U. S. Army Corps of Engineers, New Orleans, La. Wunderlich described methods used in the bayou state for hyacinth control, and showed slides of various machines specially developed for controlling the weed.

An important facet of mechanical control is the bruising of rhizomes, which causes hyacinths to die. But mechanical control is expensive and time-consuming, so the chief emphasis is now on chemical control methods.

"We must kill the hyacinth at its source," Wunderlich said. He described various chemicals (including sodium arsenite) which have been used for this purpose, and said his district now uses the amine salt of 2,4-D applied with a Bean power sprayer. The Louisiana program has been highly successful, Wunderlich said.

Another Corps of Engineers expert, Charles D. Zieger of Jacksonville, presented a history of water hyacinths and detailed efforts at control in the important St. Johns River.

Similar to the Louisiana tactics, Zieger's use of 2,4-D has also met with success.

Uses Bean Pump

"The most efficient spray pump being used by the Corps is the high pressure John Bean Royalette 10GPM Pump," the engineer indicated. "This is operated at 300 psi with a John Bean quick-acting trigger valve spray gun with adjustable barrel using a number 10 tip."

Since chief interest centers around chemical control, convention planners scheduled a thorough lineup of technical men from major manufacturers of aquatic herbicides. These men outlined characteristics of their various products, and answered questions concerning them.

Shell's Aqualin Described

One such chemical which has apparently been used quite successfully is Aqualin, a product of the Shell Chemical Company. Delegates got a rundown on this chemical from John Hussey, sales manager of Southern Mill Creek Products Company, Tampa, which distributes and applies the Shell herbicide.

"Basically," Hussey said, "there are two methods of applying Aqualin herbicide: one, in flowing water, in which Aqualin is added to water at one or more points and is

carried through the canal by the current, and two, in static water, where distribution is effected by moving spray equipment."

Aqualin is used for control of submersed weeds, and has been applied by Hussey's crew in two ways, by moving equipment in a truck along the river bank, or by moving machinery in a boat.

In October, 1960, Southern Mill Creek applied Aqualin on a commercial basis to a number of large canals in Ft. Lauderdale, Hussey revealed. These canals were heavily infested with elodea, contained brackish water, and were also affected by tidal movement.

Hussey said the treatment was highly successful, and that the canals today are still free of weeds.

Another aquatic herbicide gaining in usage is Diquat, a product of the Ortho Division, California Chemical Co. A. C. White, Ortho Field Technical Specialist from Orlando, was on hand to explain Diquat's formula and mode of action.

Rapid results, non-volatile formulation, and reduced selectivity are among Diquat's strong points, White reported. Because of the reduced selectivity, Diquat is valuable for controlling mixed weed populations, and reinfestation problems are minimized.

Highly selective herbicides kill one weed, only to let another take over, White elaborated.

As a weapon against submerged weeds, Diquat has several advantages too, the Ortho specialist commented. Ease of handling, low toxicity to fish, and longer control periods make the herbicide ideal for underwater growth.

Diquat, Photosynthesis Tied

Delegates were interested to learn of Diquat's unusual action. Herbicidal activity takes place only during periods of photosynthesis, so light is a necessary factor when using Diquat.

Other reported uses for the chemical include killing of above ground weed growth around gardens, buildings, fence lines, parkways, etc.

Amchem's Amitrol-T Researched

Three years of exacting research are behind Amitrol-T, aquatic herbicide from Amchem Products, Ambler, Pa., Amchem representative John Gallagher explained. Gallagher spoke on Tuesday's program.

Amitrol-T was studied by Dr. D. E. Seaman, formerly of the U.S. Department of Agriculture's Aquatic Weed Research Laboratory in Fort Lauderdale. Four different formulations of 2,4-D, and formulations of emid, fenac, and amitrol were evaluated at several application rates for control of water hyacinth in a three-replicate experiment.

The amitrol formulation was more effective than any other material at equivalent rates, and yielded nearly complete control at 2 lbs./acre.

Fragile, pale, beautiful — here is the water hyacinth in bloom. This innocent looking plant now chokes hundreds of miles of southern waterways, is a scourge to navigation, and provides breeding spots for mosquitoes. Members of the Hyacinth Control Society are dedicated to the control of this flowering, prolific weed.

"The slow acting but remarkable control of water hyacinth by the amitrol formulation was especially interesting," Gallagher said, "because this herbicide might be used where 2,4-D compounds are hazardous to crops or ornamentals."

Although maximum effects of Amitrol-T take about four weeks longer to develop than those of 2,4-D, regrowth and consequent loss of control are less in plots treated with amitrol than in those treated with 2,4-D, Gallagher continued.

This effective supression of regrowth is probably due to Amitrol-T's superior translocation through stolons from parent to offshoot plants.

Two new herbicides from the Pennsalt Chemical Company, Hydrothol and Herbicide 191, were scrutinized in a paper prepared by J. L. Frizzell, Pennsalt Southeastern Technical Supervisor from Montgomery, Ala.

Both compounds are derivitives of Endothal, which Pennsalt produces.

Frizzell said the two chemicals are available either as a water soluble liquid concentrate or as granules, and are effective for control of elodea, milfoil, chara,

Field trip to the USDA Aquatic Weed Research Laboratory in Ft. Lauderdale gave delegates first-hand insights into weed identification and investigation techniques. Tour hosts were Drs. Lyle Weldon and R. W. Blackburn, laboratory staffers.

New Hyacinth Helmsmen — these seven men were elected to guide the Hyacinth Control Society through the coming year, which promises to be one of rapid growth for the two-year old organization. Seated left to right are Herbert Friedman, secretary-treasurer; William Dryden, president and editor; and Wayne Miller, vice president and immediate past president. Standing left to right are directors Dan Gorman, A. S. Chipley, Jack Salmela, and Mel Williams.

etc. in irrigation and drainage canals, lakes, and ponds.

In 1961 experiments, Hydrothal at 3 and 5 ppm in small farm canals gave 100% control of southern Naiad, Frizzell claimed.

Pennsalt's Hydrothal Called Safe

Extensive toxicity studies have shown Hydrothal to be a safe chemical when used as directed, and effect on fish seems to be negligible. Studies of the degradation of herbicide residues indicate Hydrothal persists for only a short time.

Other uses for Hydrothal, Frizzell suggested, include algae control for ponds and lakes. Tests in 1960 and 1961 showed control of cadophora and pithophora with dosages of 0.25 to 0.5 ppm acid equivalent applied both as a liquid and a granular.

L. L. Coulter from The Dow Chemical Company, Midland, Mich. filled delegates in on Dow's aquatic herbicide, Kurosal.

Kurosal Is Granular and Liquid

Available both as a granular (Kurosal G) and as a liquid (Kurosal SL), this herbicide was described as effective against a variety of aquatic weeds including water milfoil, elodea, and water hyacinth.

Kurosal should be applied early during the growing season, Coulter told the group, when weeds are actively growing but have not yet formed dense floating mats.

Applications during late summer are not as effective because of extensive weed growth.

Recommended rate for Kurosal SL is 1 gallon per acre-foot of water. (An acre-foot is one surface acre in area and one foot deep.) This liquid formulation is applied directly to the water's surface, undiluted. The granular product can be applied by hand, or with a spreader similar to the Cyclone Seeder.

Both formulations should be used in quiet water.

Advantages of Diamond's Dacamine

In Wednesday's windup sessions, delegates' knowledge of current herbicides was rounded out by a discussion of Diamond Alkali's Dacamine, an oil-soluble, water-emulsifiable amine salt of 2,4-D and 2,4,5-T.

Diamond's Tom O. Evrard, Southeastern Technical Representative from Hampton, Ga., said Dacamine has several advantages in weed and brush control.

First, the compound acts somewhat like an ester, which is more effective than salts, but has the nonvolatile features of regular amines. Combining effectiveness of esters with safety of amines was the chief reason for development of Dacamine.

Dacamine can also be used later in the growing season than other amine salts because 5 or 10 gallons of oil can be added to the spray solution, Evrard said. This is important in brush control.

In cold weather, Dacamine does not salt out like regular water-soluble amines, but becomes more viscous, like esters.

Finally, indications are that Dacamine will control certain weeds which have become resistant to 2,4-D and 2,4,5-T.

Evrard said most data on Dacamine is still "observational," and the company would therefore be willing to work with any applicators to obtain more field trial results.

Analysis of new and current herbicides was a significant part of the Hyacinth Control' Society's annual meeting, but other aspects of the aquatic weed problem were thoroughly examined.

Group Tours USDA Lab

One highlight was an afternoon tour to the U. S. Department of Agriculture's Aquatic Weed Research Laboratory in Ft. Lauderdale, escorted by USDA staffers L. W. Weldon and R. W. Blackburn. These scientists also presented delegates a valuable illustrated session on weed identification.

Proceedings of the three-day meeting which combined technical and practical information are available to nonmembers at $5.00 each, and can be ordered for shipment in about six weeks.

Included are copies of all talks given, along with dozens of identification photos. Send check with orders to William Dryden, Lee County Hyacinth Control Commission, P. O. Box 1711, Fort Myers, Fla. Dryden serves as editor for the society, and was also elected president during the annual business meeting.

Other officers elected at Ft. Lauderdale include Wayne Miller, vice president. Miller is immediate past president of the organization, and is director of the Lee County

Hyacinth Control Commission, of which Dryden is commissioner.

Secretary-treasurer for the coming year is Herbert Friedman, president of Southern Mill Creek Products Co., Inc., Tampa. This is Friedman's second term in the post.

Directors installed were A. S. Chipley, Lee County Hyacinth Control Commission; Jack Salmela, Brevard County Mosquito Control Director; Dan Gorman, Hillsboro County Mosquito Control Director; and Mel Williams, Sarasota County Mosquito Control Director.

Friedman told *Weeds and Turf* that next year's meeting will probably be held in Tampa, but exact time and place will be announced later.

Chlorea Herbicides

(*from page W-5*)

signed to apply granular materials. Usual rates of application are 1 to 2 pounds per 100 square feet. One-half pound per 100 square feet is frequently all that is required for annual follow-up treatments.

Safety to Man and Animals

The individual chemicals in Chlorea products are generally regarded as having rather low toxicities to man and animals. It may be fairly concluded, therefore, that the Chlorea herbicides can be considered generally nonhazardous to mammals under normal conditions of use. It is, nevertheless, advisable not to leave containers or chemicals where children or animals may have access to them.

Precautions

Avoid applications in periods of hot, dry weather, because killing action of Chlorea herbicides is generally through the roots and is dependent on soil moisture. The Chlorea sprays, however, will burn off the tops of weeds at any time and will be effective on the roots as soon as rain falls. Be careful not to apply on or near valuable trees, shrubs or other ornamentals, or to areas into which these roots may extend. Also, do not use on slopes where runoff will move the chemical into the root zone of turf or desirable plants and trees. Remember that all three products should be used only where unproductive soil is not an objection.

Book Review

Diseases of Turfgrasses

by Dr. Houston B. Couch, Rheinhold Book Division, New York, N. Y., 1962, 304 pps. $10.00.

Extensive appendices and thorough classification tables are among the best features of this new textbook designed to help CAs, and turfmen in general, with the complex problems of disease control.

Nearly 100 pages are given over to analysis of turfgrass disease chemicals, and grasses susceptible to ailments. Arranged both by common and technical names, these tables provide a handy guide which could be used by technical directors and servicemen alike.

Couch's new text is more than a handbook, however. In the first 178 pages, the distinguished author delves insistently into the rudiments of both fungus and nematode-incited diseases, and gives valuable pointers on how to tell one disease from another.

A section on the fundamentals of disease control is a welcome facet of author Couch's comprehensive reference work. This indispensible background material is designed to aid the newcomer to turfgrass disease control, and at the same time is a convenient reminder for the experienced professional.

Another highlight of the volume are the illustrations, both full color and black-and-white, which give vivid reinforcement to the details set forth in the text.

Couch, who is an associate professor of plant pathology at Pennsylvania State University, has given the contract turf spraying field a valuable tool in his new book. While not an inexpensive publication, serious students of the field will find this reference an important buildingblock to further understanding of turfgrass diseases and how to control them.

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300 Expected at Midwest Turf Day

Nearly 300 delegates are expected to attend this year's annual Midwest Turf Field Days scheduled for September 10 and 11 on the campus of Purdue University, Lafayette, Ind.

Made up of applicators, supplier staff technicians, government and university researchers and others, the group will spend most of the day in outside examination of Purdue research work.

More information is available from Dr. William Daniel, group secretary, at Purdue.

Literature *you'll want . . .*

Here are the latest government, university and industrial publications of interest to contract applicators. Some can be obtained free of charge, while others are nominally priced. When ordering, include title and catalog number, if any. Sources follow booklet titles.

Sprayers for Weed Control Chemicals. Agronomy Dept. Mimeo No. 60. 4 pp. University of Maryland Extension Service, College Park.

Aquatic Weed Control. Circular 219. 16 pp. il. 1962. Agricultural Extension Service, University of Florida, Gainesville.

Weed Control in Western Irrigation and Drainage Systems. Agricultural Research Service and Bureau of Reclamation Joint Report No. 34-14. 24 p. 1960. U.S. Department of Agriculture, Washington 25, D. C.

Lawn Diseases in the Midwest. North Central Regional Extension Publication No. 12. 16 p. il. 1961. University of Nebraska Extension Service, Lincoln.

Use of Low Volume Sprayers for Applying Atrazine 80W and Simazine 80W. Bulletin GAC 630. folder. il. Geigy Agricultural Chemicals, P. O. Box 430, Yonkers, N.Y.

Weeding with Chemicals: 1962 Guide. Bulletin ID-1. 20 pp. Purdue University Agricultural Extension Service, Lafayette, Ind.

Potassium Cyanate Controls Crabgrass and Chickweed. Bulletin F-255. 8 pp. il. American Cyanamid Company, Agricultural Division, Princeton, N.J.

Johnson Grass Control. Agronomy Dept. Mimeo No. 16. 2 pp. University of Maryland Extension Service, College Park.

Poison Ivy, Oak, and Sumac: Identification and Control. Ext. Folder No. 144. 6 pp. il. North Carolina Agricultural Extension Service, Raleigh.

What the Experts Say about Crabgrass Control. 24 p. il. Agricultural Chemicals Div., Diamond Alkali Co., 400 Union Commerce Bldg., Cleveland, O.

Turfgrass Diseases. Circular 207-A. 1960. 16 pp. Colorado State University Extension Service, Ft. Collins.

Control of Cattails in Ponds. Leaflet 229. 4 p. University of Kentucky Extension Service, Lexington.

Know Your Species

HENBIT

(Lamium amplexicaule)

Henbit, a winter annual or biennial that reproduces by seeds and rooting stems, is a serious pest in lawns, turf, gardens, cultivated fields, and waste places. It is particularly troublesome in fertile soils. Henbit is also variously known as dead nettle, blind nettle, or bee nettle.

Common throughout eastern North America and the Pacific Coast, henbit is also found in the Northcentral states. It is thought to have been introduced from Eurasia.

Stems are 4 to 16 inches tall, slender, smooth (not hairy) and 4-sided. There are many branches that are more or less prostrate with ascending tips. Henbit frequently roots where nodes (joints where leaves are attached to the stem) are in contact with the ground.

Leaves are opposite each other on the stem, and are hairy with rounded teeth. Lower leaves have petioles (stalks), while upper leaves, without petioles, clasp the stem directly. Leaf veins radiate in a fanlike pattern from approximately one point. These leaves are nearly circular.

Flowers are whorled (found in groups of more than 3 at the node), and are located among the upper leaves. Henbit blooms are tubular but 2-lipped, about 3/8 inch long, and range from pinkish to purple.

Seeds are borne 4 in a pod, sharply 3-angled, grayish-brown, about 1/16 inch long.

Silvex and 2,4,5-T give good control and 2,4-D offers fair results. Apply according to directions on the label.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

DRAWING BY REGINA HUGHES, USDA, BELTSVILLE

Geigy to Hold Weed Clinics

A new series of weed control clinics for pest control operators and contract applicators is being offered throughout the country this year and next by Geigy Agricultural Chemicals Division, Geigy Chemical Corporation.

"Enthusiastic receptions that PCOs and CAs gave last year's clinics have influenced the company to present another program this year," a Geigy spokesman told *Weeds and Turf* at presstime.

Contents of the new courses will be completely different and will lay major interest on industrial weed control.

Increasing interest on the part of PCOs and contract spraymen in general in the booming vegetation control market prompted Geigy to concentrate on killing weeds in the '62-'63 clinics.

New information on Diazinon will also be presented.

Meetings will be held in most major cities as they were last year and invitations will be sent to PCOs and CAs asking them to attend the clinics in their areas.

First program was held in Kansas City, Kans., on July 19, 1962, followed by clinics in Georgia and North Carolina the week of July 23.

PCOs and CAs should contact their local Geigy representatives if they wish to attend. Or write directly to Geigy Agricultural Chemicals Div., P. O. Box 430, Yonkers, N. Y.

Bagworm Spray Season Here

Now's the time for CAs to sell their customers on a custom spray job for bagworms. Purdue University entomologist Glen Lehker says the pests are already present and feeding on foliage, but their presence may possibly go undetected. Evergreen trees and shrubs are most likely to be attacked.

Lehker says bagworms can be controlled with either malathion or Diazinon.

Malathion is available as a 57% emulsifiable concentrate which can be mixed at the rate of 2 teaspoons per gallon of water. Diazinon is usually purchased as a 25% emulsifiable concentrate which is used at the rate of 3 teaspoons per gallon.

Emmi, New Turf Fungicide, Introduced by Velsicol

A new turf fungicide, said to be especially effective on dollar spot, has just been introduced by the Velsicol Chemical Corporation.

Designated "EMMI," the new fungicide is said to have little or no phytotoxic effect on St. Augustine, Zoysia, ryegrass, bahia, Bermuda, and centipede grass. Velsicol recommends 1½-2 oz. EMMI in 10 gallons of water per 1000 sq. ft.

Higher dosages should be used with caution, especially during hot weather.

EMMI is described as "quick acting and long lasting," and is easy to handle because its liquid form dilutes easily, and won't clog nozzles.

Velsicol says a gallon of the new substance is enough for 12 to 16 average spray jobs. In most cases, the firm claims, only one treatment is needed to clear up disease.

CAs who want more information about EMMI should write the manufacturer at 330 East Grand Ave., Chicago 11, Illinois.

John Blue Machines Described

A complete catalog of sprayers, pumps, nozzles, and booms made by the John Blue Company, Inc., is now ready for applicators interested in reading of the firm's equipment.

"While we're primarily agricultural manufacturers," John Blue's, Michael Graznak, told *Weeds and Turf*, "much of our machinery is ideally suited for use by contract applicators."

CAs who want to know more about the company's products should write the firm at Huntsville, Ala., and ask for bulletin 7-D-2.

Sheet on Broyhill Pump Ready

An informative, illustrated sheet describing the Broyhill 805-RL combination pump and tank spray unit can now be obtained from the manufacturer, Broyhill Company, Dakota City, Neb.

Broyhill says the 805 provides CAs with a convenient single-unit, high-low pressure sprayer, when both gun and boom options are selected.

Meeting Dates

Rhode Island Field Days, University of Rhode Island, Kingston, Aug. 15-16.

American Society of Agronomy 54th Annual Meeting, Cornell Univ., Ithaca, N.Y., Aug. 20-23.

American Society of Plant Physiologists, Department of Botany and Plant Pathology, Oregon State University, Corvallis, Aug. 27-31.

Florida Turfgrass Conference, University of Florida Student Service Center, Gainesville, Aug. 28-30.

Midwest Turf Field Days, Purdue University, Lafayette, Ind., Sept. 10-11.

North Central Weed Control Conference, Hotel Lowry, St. Paul, Minn., Dec. 3-5.

Northeastern Weed Control Conference, Hotel New Yorker, New York, N.Y., Jan. 9-11, 1963.

Southern Weed Control Conference, Admiral Semmes Hotel, Mobile, Ala., Jan. 16-18.

California Weed Control Conference, Santa Barbara, Jan. 22-24.

Aquatic Weed Control Society Annual Meeting, LaSalle Hotel, Chicago, Ill., Feb. 12-13.

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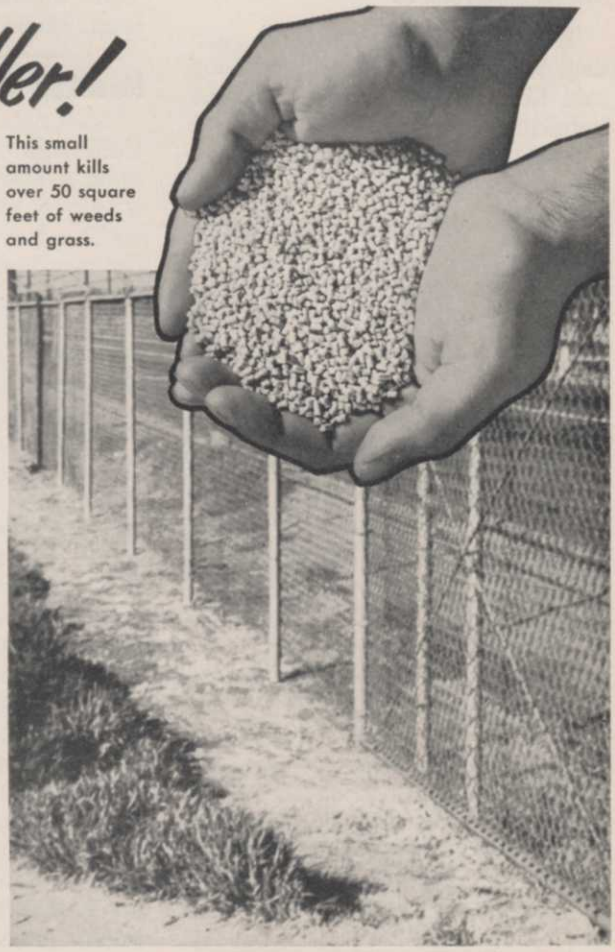

—W & T Mailbox—

"Very Interested . . ."

I was very much interested in the first issue of *Weeds and Turf*. I think you have done an excellent job in its preparation and if future issues are as good as the first I am sure that it will be of much interest to those engaged in weed control and turf work and really fit a need.

Dr. L. C. Chadwick

Secretary-treasurer
National Shade Tree Conference
Professor of Horticulture
Ohio State University
Columbus

'Fine Start . . ."

My sincere congratulations to you on the *Weeds and Turf Section*. It is a fine start and well done!

R. C. Hudson

President
H. D. Hudson Mfg. Co.
Chicago, Ill.

"Most Helpful . . ."

We received a copy of your first publication of *Weeds and Turf* and find it most interesting and helpful.

I very much appreciate receiving your periodical.

Harry E. Chamberlain

Junior Plant Physiologist
Colorado State University
Fort Collins

"Much Needed Communication . . ."

Just wanted to tell you that we feel *Weeds and Turf* provides a much needed channel of communication to a much-neglected market.

Congratulations! We think you've hit one!

B. T. Givauden, Jr.

New York, N.Y.

Weeds and Turf welcomes expressions of opinions from its readers. Send ideas and comments briefly as possible to Charles D. Webb, Editor, Weeds and Turf, 1900 Euclid Ave., Cleveland 15, Ohio.

Zytron Good for Nimblewill

Use of Zytron for control of nimblewill in Kentucky bluegrass lawns was favorably reported recently by scientists working at the Kentucky Agricultural Experiment Station, Lexington.

Tests carried out over a two-year period showed that two applications of liquid Zytron at 15 lb./A are necessary to curb this troublesome weed. One application at 20 lb./A also gave good control.

To obtain complete eradication, it may be necessary to make certain spot treatments with Zytron after the initial application.

Spring and early summer applications of Zytron were apparently more effective than treatments in late July, August, and September.

Dry formulations of Zytron were not effective on nimblewill, the Kentucky scientists report.

Further experiments with Banvel D at 4 and 8 lb./A gave variable control of nimblewill with one application, but results indicate more study is necessary to evaluate this chemical fairly.

Zytron is manufactured by the Dow Chemical Company, Midland, Mich.

New Lab Device Tests Weedicides

Scientists at the University of California, Riverside, have developed a new tool for speeding up studies of weed killers. Laboratory staffers have humorously dubbed the new machine "the pot and the pendulum."

Literally, a flower pot with a pendulum suspended overhead, the new evaluator is set in a 10-foot-high frame. The 5-foot pendulum carries a tiny spray tank on its lower end. As this tank swings over a flower pot containing weed-infested plantings, a small quantity of weed killer is applied over a predetermined area.

Each application corresponds to a mixture volume of 32 gallons per acre. Two passes of the pendulum equal a per-acre rate of 64 gallons.

If two passes of the pendulum knock down weeds in a potful of merion bluegrass, for example, staffer Boysie Day and his colleagues can estimate the appropriate commercial dosage for any given area planted with this particular grass.

—Trimmings—

Indefatigable. **That's the word for Tom Hammal, state publicity director for the Horticultural Spraymen's Association of Florida. Besides having a neat little business of his own that he runs with great pride in the greater Miami area, he's the spark behind much of the HSA educational program to improve safety practices among applicators in his state. Think we've found the secret to his endless energy . . . it's the pot of coffee that's always brewing at his Bow-Arrow Gardens office.**

* * *

Grandaddy back. Floyd L. Timmons, head of USDA aquatic weed research headquartered at the University of Colorado experiment station and widely recognized as the grandfather of practical weed control, is back after a year's study for his PhD. It takes an unusual man who already is known as an expert to have the drive to go back for more schooling after so many years. Always generous with his help, Dr. Timmons was most instrumental in putting our editors straight during the germination days of *Weeds & Turf*.

* * *

It's a beauty. **One man who's done a dandy job of combining contract weed and turf pest control with general household exterminating is L. W. Hurt of Odessa, Texas. He has a gorgeous, drive-in landscaped entryway to his nearly block-long building that makes it easy for customers to load up on garden supplies when they come to call. He's another of the hundreds of applicators who successfully combine service with retail sales.**

* * *

Follow-up on Viet-Nam. Last month we heralded the military's latest strategy which employed weed killers to reduce enemy undergrowth hideaways. Well, now word comes that the defoliation experiment failed. Insiders say it was politics, not chemical ineffectiveness which made the project less than successful. The State Department, fearing "germ warfare" charges from the Reds, objected to the use of arsenic compounds and forced the army to use less effective herbicides. Next idea?

* * *

Weed Farm. **Two men who thoroughly *enjoy* growing weeds are Bob Blackburn and Lyle Weldon, keymen at the USDA's Aquatic Weed Research Laboratory in Fort Lauderdale. Last month their staff kept four groups of Hyacinth Control Society conventioneers alive with interest during a two-hour tour of their weed farm and laboratories. Here virtually every type of aquatic weed is grown so these researchers can devise the most effective chemical and mechanical ways to destroy them. It was quite an experience to see the loving care with which these experts rear the water weeds, take pictures of them in all stages to help applicators properly identify them (we'll be printing some of them in the near future), and then carefully employ the safest and most scientific methods to rid our waterways of these aquatic cloggers. If you're ever down Fort Lauderdale way, we'd suggest you stop out to see Lyle and Bob.**

Changing Your Address?

If so, notify our circulation department right away to be certain the magazine reaches you at your new location. The Post Office won't forward your copies. So when you write us, make it at least three weeks in advance of your moving date, and include your old address, as well as the new one. We'll see you don't miss a single issue. Send this old and new address information to:

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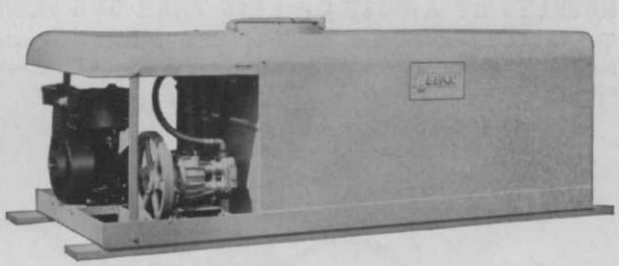

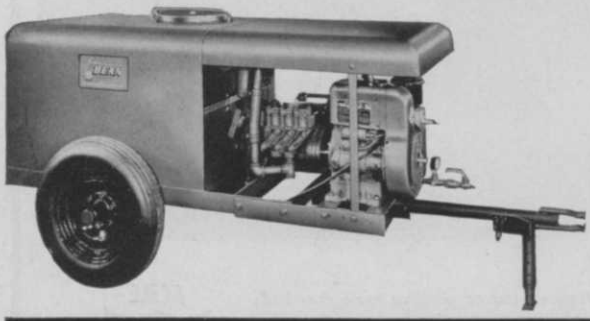

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